Measurements of open-charm hadron production and total charm cross section in Au+Au collisions at $\sqrt{s_{\mathrm{NN}}} = 200\,\mathrm{GeV}$ by the STAR experiment

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Measurements of open-charm hadrons in ultra-relativistic heavy-ion collisions are an important part of the heavy-ion physics program of the STAR experiment. The charm quarks can be used to study the properties of the Quark-Gluon Plasma (QGP) as they are produced predominantly in hard partonic scatterings at the very early stage of heavy-ion collisions which means that they experience the whole evolution of the hot and dense medium. The STAR experiment is capable of topological reconstruction of hadronic decays of the open charm hadrons thanks to the excellent pointing resolution of the Heavy Flavor Tracker.

In this poster, we present the final results on the measurements of D^0, $\mathrm{D}^{\pm}$, $\mathrm{D_s}$, and Λ_c in Au+Au collisions at $\sqrt{s_{\mathrm{NN}}} = 200$ GeV. The extracted invariant yields of D^0 and $\mathrm{D}^{\pm}$ mesons are used to calculate the nuclear modification factor R_{AA} which reveals a significant suppression of high-p_T D mesons in central Au+Au collisions. The $\mathrm{D}^{\pm}$, $\mathrm{D_s}$, and Λ_c measurements are compared to that of D^0 mesons via transverse momentum and centrality dependent yield ratios. These ratios are compared to multiple theoretical models incorporating various charm quark hadronization schemes. The measurement of $\mathrm{D}^{\pm}$ concludes the measurements of major ground states of open-charm hadrons in Au+Au collisions by the STAR experiment. This allows, for the first time, to calculate the total charm quark production cross section per nucleon-nucleon collision in Au+Au collisions, which will also be shown.